



An Approach to Fleet Architectures

for the Director of Force Transformation Office of the Secretary of Defense

H. H. Gaffney

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An approach to fleet architectures

H. H. Gaffney

The CNA Corporation

Summary

This paper responds to Art Cebrowski's request for my views for a response to the Congressional tasking on fleet architectures for the U.S. Navy. This response attempts to put the evolution of hulls¹ into the transformation context. Hulls do not constitute the entire system that is the U.S. Navy; fleet architectures go far beyond hulls, especially in their war-fighting systems. But at its heart the Navy floats on water. Otherwise, it would not be a navy, but something else, like an air force or a space force. Those hulls do carry fighting capabilities wherever the nation would like them to go, or include auxiliary hulls that support the hulls with fighting capabilities.

The essence of the Cebrowski notion of transformation, as I shall interpret it here, is that the fleet—here interpreted as its hulls—should be in a “becoming” state, always evolving, not getting so fixed in configurations and specifications as to preclude the fleet's adaptation to whatever change in circumstances may arise nor to preclude opportunities that evolutions in technology or industrial methods may present. This means building prototype hulls before committing to long serial production runs, and building both prototypes or serial items with flexibility, adaptability, and learning room so that alternate fighting capabilities might be installed on them with the passage of time and circumstances.

Hulls are nodes in the overall war-fighting system of the U.S. Navy and of the nation.² This war-fighting system is not only naval and naval capabilities, but is joint, for that is the direction in which the U.S. defense effort is going. Why joint? It is because U.S. war-fighting efforts as they have unfolded after the Cold War and out into the future tend to be both concentrated when applied (especially without the global competitor that the Soviet Union was) and operating through its connections in all the dimensions—land, air, water, and space—in a coordinated and synergistic way. Hulls are nodes with connections to other nodes. Some nodes are hubs making

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1. The use of the word “hulls” here is short for what the U.S. Navy calls “HME” (hull, machinery, electricity). This should be borne in mind whenever I use the word “hulls.”
 2. See Peter J. Denning, “Network Laws,” *Communications of the ACM*, Vol. 47, No. 11 (November, 2004), pp. 15-20, for discussions of nodes and links.

critical connections, or super-nodes, and it is not precluded that some hulls may be hubs, though hulls floating on water may always be constrained by size and bandwidth—and possibly vulnerability.

The “becoming” aspects for hull transformation over time do not preclude the retention of legacy hulls, given their capabilities and sunk costs. After all, the legacy hulls have proved themselves in combat experience since the end of the Cold War in creating, along with the rest of the U.S. defense system, a unique and unparalleled “American War of War” that should continue to be useful for many years to come, with continuing refinements (providing the hulls and other nodes can absorb them) as time passes.³ After all, other countries have and continue to buy what are still largely legacy forces. Their own “becoming” experiments are severely limited. The U.S. and other advanced countries are facing new, widespread (maybe even global) threats from Islamic terrorists, and these terrorists may be clever in using some global technologies, but the kind of networked war-fighting synergies to be addressed here are beyond their capabilities, given their dispersion and lack of industrial access. As for U.S. legacy forces, it doesn’t mean that they need all be kept if shrinkage in some dimensions permits expansion in the “becoming” force and systems.

As for what these becoming hulls might turn out to be, I won’t have the answers here, partly for lack of imagination and partly to avoid getting trapped into being an advocate for the current series of new hulls for which the Navy is providing R&D and even procurement funding (e.g., LCS, DD-21, LHA(R), MPF(F), CVN-21). Rather, this paper attempts to address both the process of becoming within the evolutions of the three spheres Art Cebrowski has suggested: force-building, force operations in The Gap, and force operations in The Core and the rules that might guide that process.

Fundamental Propositions about the U.S. Navy

The U.S. Navy goes by sea and helps the other services to go by sea, especially since the U.S. generally crosses the oceans to pursue its security and that of the world. Floating hulls can carry far bigger loads than aircraft (typically, 90 percent of tonnage goes by sea to any big operation), leaving aside homeland defense. If the Navy weren’t floating in hulls, it wouldn’t be a navy.

Naval hulls are generally armed with war-fighting capabilities of some kind, or support war-fighting capabilities on other hulls. If not, they wouldn’t be naval hulls. There is no MSC-only navy in the world.

3. Of the total of \$69 billion in R&D requested by the Administration for FY05 (increased by Congress to \$71 billion), \$20.5 billion was earmarked for “Operational Systems Development,” including \$3.2 billion for the Navy.

Just about all human activity in the current historical era is on land. the exceptions are global trade crossing waters, coastal trade, fishing, and the rather scattered and episodic raids on shipping by pirates. It is hard to imagine battles between navies in the open oceans these days. It is easier to imagine warfare on the waters just off the coasts (though there is little experience—Earnest Will as the most severe). Indeed, most navies in the world are becoming coast guards if they were not already.

Hulls when built represent investments and their sunk costs. They tend to represent rather large commitments, for which the replacement costs are high. They tend to last a long time. Systems on hulls are more flexible and changeable—providing they are not in such a tight symbiotic relation with their hulls that they represent near-single capabilities. And the systems that the hulls carry have, over time, made up more and more of both the initial and lifetime costs (e.g., 50 percent of the cost of a DDG-51-class destroyer is in the systems, and some larger figure for a carrier is represented by their aircraft).

Hulls provide transport, power, crew quarters, fresh water, and fuel and ammunition storage. Speed probably doesn't make much difference—speed means more in the aircraft or missiles the hulls carry.

The U.S. Navy largely manages itself, once successive Administrations decide what to fund and Congress appropriates the funds. It keeps up its capital stock, recruits, retains, trains, and assigns people (while providing them and their families quality of life), operates and trains on its hulls (which uses fuel and wears parts out), conducts research and development, and builds new hulls, aircraft, weapons, and other systems. When operating overseas, it may interact in exercises with other navies and visit ports. It sometimes gets to fight, almost always under direction from U.S. political authorities and in a joint system.

Yet the U.S. Navy is dependent on the larger budgetary and war-fighting system of the United States. The Administration and Congress provide budget and spending rules. The Administration provides strategic guidelines. When the Navy deploys, it reports to the joint Combatant Commanders, who tell it where to go and who take command for combat operations. The Administration decides when and how the Navy will fight and under what rules. In terms of networks, the Navy is dependent on U.S. space assets, communications, others doing most of its intelligence, surveillance, and reconnaissance, though it also contributes inputs into those networks as well as receiving outputs. It is also dependent on U.S. Air Force refueling for its aircraft, as especially demonstrated in combat operations in the post-Cold War period, and especially when flying deep inland. All services are now dependent on GPS to know their locations.

The World Situation

The security situation has changed (and has evolved) since the end of the Cold War. Navies vs. navies is gone except in coastal waters—and those coastal waters of concern are limited (the Gulf, the Strait of Malacca, around Taiwan, and around Korea). The threats to the U.S. Navy in even those places are not overwhelming, though people are worried about the Russian Kilo submarines that have been sold to Iran and China.

The most evident threats to world security today still divide as follows: (1) the Islamic terrorists, (2) internal conflicts, which can generate persistent insurgencies, though not as global threats, (3) the very few rogues left with decaying conventional forces, but two of which—Iran and North Korea—are now toying with nuclear weapons to compensate, and the continuing tense situation between China and Taiwan.⁴ In the meantime, the United States is continuing operations in Iraq and Afghanistan, where the outcomes are still not clear, at least in Iraq.

It is uncertain where the Administration may commit forces next, under its preemption strategy or under other demanding circumstances. The U.S. invading Iran or North Korea would seem to be daunting. The U.S. has shown little inclination to intervene in internal conflicts, from Rwanda through Liberia to Darfur, but such interventions would not involve many forces in any case. The U.S. Government is slowly building its protections against terrorists entering the U.S., but has not committed to, say, the U.S. Navy patrolling the approaches to the homeland. A next horrendous terror incident could change that. The U.S. also would be prepared to retaliate upon a terror attack, but without al Qaeda having established a new base like the one it had in Afghanistan, where would that be? The Combined Joint Task Force Horn of Africa (CJTF HOA) seems to have little to do from its base in Djibouti. The U.S. would like to reform Islamic countries, but does not know how and the countries are not yet amenable to U.S. guidance.

However severe each of these threats may be, the new world security situation is much more “irregular” and the situations are almost all on land. Most of the world is actually at peace.⁵ Whether it continues this way remains to be seen, but classic military establishments are for the most part on the decline around the world. China’s direction in this regard is not yet known—especially to the Chinese themselves, given

4. See H. H. Gaffney, *The Changing Nature of Warfare: Extension of the Report of a Conference at The CNA Corporation, 25-26 May 2004, as part of the Global Trends 2020 project of the National Intelligence Council* (CNA Document CIM D0019879.A1/Final, October 2004).

5. See the International Institute of Strategic Studies, “The 2004 Chart of Armed Conflict,” circulated with their *The Military Balance, 2004-2005*.

the dynamics of their participation in the global economy. Hedging on China's direction is appropriate for the United States to do.

All of this leaves the U.S. Navy and its fleet as part of what the U.S. does to maintain the overall world security system—a function not fully appreciated within the U.S. The fleet is part of the U.S. system, with its many nodes, hubs, and connections. Some dream of the hulls as hubs in the system, which they may well serve as for some as-yet unknown situations. They are limited in size and bandwidth to serve as hubs, and much of the hubs tend to be at “reachback” locations, as demonstrated in Operations Enduring Freedom and Iraqi Freedom (e.g., the CAOC at Prince Sultan airbase in Saudi Arabia). So the task is to regard hulls as nodes in the overall U.S. war-fighting system and find the best kind of hulls to serve these purposes.⁶

Some basic constraints

The major constraints to exploring fleet architectures for the future are:

- **The top line of the budget.** The U.S. Federal budget is in deep deficit. Together with the current accounts deficit, the value of the dollar, interest rates, and inflation rates may be affected adversely in the next few years. These conditions may cause the Administration and Congress to level out the defense budget rather than continue the increments of growth that have taken place since 9/11. Moreover, continuing operations in Iraq and Afghanistan, which are likely to last for at least the next two years, are taking supplementals to cover, thus adding to the deficit, and are wearing out ground forces' equipment, which may have to be restored and replaced—not necessarily in some transformational way. The experience in Iraq is also likely to result in the addition of more active ground force personnel, and this could be a restraint on the resources available to the Navy and Air Force. The Navy itself is not particularly strained by current operations, though fuel prices are high right now.
- **Legacy forces.** While the numbers of ships tends to erode over time, the U.S. Navy still has substantial investments in existing ships and in new construction that is in the program-of-record. The program-of-record, however, shows that the Navy is entering something of a trough in construction since the configurations of LCS, DD-21, CVN-21, LHA(R), and MPF(F) are not yet set

6. The U.S. Navy is not particularly relevant to one of the biggest debates now taking place in the U.S. defense establishment, that is, on what and how many forces should be earmarked for “pacification and stabilization” inside countries that the U.S. may have occupied. Right now in Iraq, the U.S. Navy contributes some air strikes, the SeaBees, and protection of off-shore oil-loading platforms in the Gulf.

and both production costs and rates are not yet known. The SSN-774 class is in production, but at only one a year. The TAKE and LPD-17 classes are also in production. A few more DDG-51s and the CVN-77 are in the pipeline. Now that the DD-963 class is about all retired, and CG-47-51 are about to be, there seem to be few other classes regarded as obsolescent and expensive to maintain that lend themselves to early retirement. New aircraft are also in the program-of-record, to include a new MMA, MV-22, JSF, and EA-18G. The F/A-18E/F and SH-60 lines are stable.

- **Taking care of people.** The costs of people in the U.S. services are going up, given the rising health costs in general in the U.S. economy, increasing pay, and increasing seniority as high retention rates are realized. The U.S. Navy is making big efforts to streamline its manning, and this is one factor that will govern the new hulls to be developed and acquired, but the benefit in saving personnel costs lie well out in the future. Some streamlining has been achieved through assignment of MSC crews to the auxiliaries and even the LCCs.
- **Readiness.** A high readiness for operations is both a U.S. tradition (e.g. since Pearl Harbor, a heritage from the Cold War where the Soviet Union was seen as poised to attack at any time—they weren't, except in the readiness of their ICBMs—but their secrecy meant that the U.S. had to hedge strongly), and now reinforced by the new Pearl Harbor, i.e., 9/11). High readiness is also a professional need, i.e., if valuable people are to be retained and ready, they must train and their equipment must be available to them. This makes for a high O&M budget. The U.S. Navy carefully balances people, O&M, and acquisitions in its programming—which may tend to squeeze acquisitions more than the industrial lobbies (see next paragraph) might like.
- **U.S. domestic political considerations.** There are influential lobbies for ship-building, submarines, aircraft, and weapons and other systems. But their ability to persuade Congress to add programs not originally in the President's budget submission seem limited. They do protect established production lines and shore facilities. I would contend that, as long as a relatively constant flow of dollars take place, the lobbies and industry are otherwise indifferent as to what those dollars buy. They are sensitive to the need to maintain skilled personnel in production facilities.

Three trajectories for consideration

Admiral Cebrowski asked me to consider the evolution of fleet architectures under three headings:

- Force building
- Force operations in The Gap
- Force operations in The Core

Force building. I interpret “force building” to be “capabilities-based planning,” that is, not connected to particular threats or scenarios, where the imagination and experimentation can roam free, exploring the possibilities of physics and exploiting commercial developments (which are perceived to be ahead of military developments these days). Motivations exist to stay ahead of any possible competitor in the world, i.e., to avoid surprises. The dynamics here are those of “brilliant ideas” and some kind of implementation.

The Gap. The Gap and the Core are the terms that arise out of Tom Barnett’s work to describe the world system under the dynamics of globalization.⁷ Some of this recognition of “two worlds” arose out of the work that some of us did on U.S. naval responses to situations, especially in the 1990s (where the responses also became much more joint and combined than in previous decades). We noticed that most responses in the 1990s were across “the seam of the world,” though concentrated on Haiti, Somalia, Bosnia/Kosovo, and Iraq. Very little took place in what we called the Core countries, those participating in the flowering of globalization, a process which took off further with the collapse of the Soviet Union and its empire and those countries’ adoptions of free-market economic systems.

With 9/11 and the full recognition of the global terrorist threat and its origins and objectives in the Islamic world, most potential action in the near future for U.S. forces, including the U.S. Navy, may lie across this area, stretching from Morocco to Indonesia and the southern Philippines. It is an unfortunate coincidence that the critical long-term oil reserves lie in the area, particularly in the Gulf. The U.S. has made a major commitment to creating a new Iraq and then spreading democracy in the heart of the Islamic world (the Arab countries), though the U.S. Navy’s role in all this is not clear, unless as it contributes to a general sense of stability. The U.S. Navy would also be involved in tracking down terrorists and conducting raids on them if

7. See Thomas P. M. Barnett, *The Pentagon’s New Map* (New York: Putnam: 2004).

the opportunities arose. The question of patrolling is an interesting one: the chances of finding terrorists at sea without cueing, without tips from intelligence sources, seem nil, however many ships are randomly queried or boarded. The same goes for the related Proliferation Security Initiative (PSI), meant to intercept WMD materials and missiles—but probably also dependent on cueing. There is also talk of the U.S. undertaking more activity in the Gulf of Guinea, where Nigeria especially is rather unstable these days, but this may wait an Administration decision on priorities. Force operations in The Gap would be, for at the near future, the dynamics of Iraq and the war on terror. For the longer future, the question is what instabilities may arise in the Islamic countries, as at least some of them countries confront the intrusions of globalization and frustrated, growing populations and in turn are confronted by rising terrorism.

The Core. As for force operations in the Core, the Core is mostly at peace. On one hand, it is the Core countries of Europe who are the most natural and long-time allies of the United States. They also have advanced enough navies for the U.S. Navy to have useful exercises with, and they are even trying out some experimental hulls (e.g., the Visby). The main question of force operations in the Core, at least for the purpose of this paper, would be how to hedge against Chinese dynamism. China is in the early stage of joining the Core, including the WTO (World Trade Organization). It has huge internal stability problems on one hand and a great dependence on external trade and especially growing imports of energy on the other. The question becomes how it behaves under these changing conditions. This is greatly complicated on the security side with regard to the nagging question of Taiwan China poses for itself. U.S. force operations in this sector of the Core, including and maybe especially those of the U.S. Navy, would be those of hedging against the rise of China. North Korea is also in the area, and in one sense has become more of a Core problem than a Gap problem, that is, the degree to which it upsets the global order depends on cooperation among the Core countries. Thus, as far as security in The Core goes, the big dynamics have to do with China.

These factors might be compiled in the following table, with particular attention to the possibilities of U.S. naval operations:

	I. Force building	II. Force operations in The Gap	III. Force operations in The Core
What's going on in world (concretely)	No peer - not for a long time and may be "dissuadable." China-Taiwan may be resolved by diplomacy. GWOT really doesn't take much forces, unless new harboring state arises or big homeland defense effort becomes necessary. NK and Iran may have nukes on missiles to deter or shoot down. U.S. tends to stays out of internal conflicts	Couple more years on Iraq & Afghanistan. Gulf & Red Sea ops. Watchful on Iran. Watchful & cooperation with Pakistan. Strait of Malacca takes big cooperative effort as piracy increases? Intercept ops in Med, Indian Ocean, South China Sea. Oiler protection? Gulf of Guinea new area to patrol?	Exercise with allies, exchange technology, experimentation. Maintain naval bases in Japan, expand Guam. Deter NK and China-Taiwan. Some activity in Med, both to keep contact with allies and possible patrols for terrorists and proliferation.
Nature of "networks competitions"	Keeping up with commercial innovations. Watch for state labs rising, e.g., -- China; Russia renewed. Continued big U.S. R&D. Terrorists exploit global networks, but own technology is crude. Competing networks (e.g., Galileo -- shut-out of possible competitors becomes harder.	The terrorists' gossamer network, intensifying in Islamic world, spreading north and south - but still dispersed. Is the A.Q.Khan proliferation network still operative? The network of people moving around world, and internet/cellphones. Oil production networks. Dhow traffic. Pirates. Shadowy financial movements and counter police work.	Global trade. 85K commercial ships, of which 1,500 are tankers. Global finance and possible crashes & panics. More commercial innovation to net all this together? Marketing? Movement of people and goods by air. Government and international agencies networks, including security alliances. China entering networks.
Joint Aspects (i.e., how independent is the U.S. Navy)	For U.S., it's all joint now (see JCIDS). Missile defense system will grow & include Navy. All kinds of commo, intell., surv., UAVs, tanking, etc. are joint. Defense-wide R&D funds bigger than Navy's (half MDA). Altogether: Navy more netted in Joint system.	Iraq & Afghanistan operations are joint (and combined). CJTF HOA is joint. SpecOps are joint. Navy patrols efficient only as cued by joint/national/international systems. Next invasion of rogue or terrorist country to be joint (not just sea-based).	Individual services tend to interact with comparable other country services (little joint). U.S. interactions with Korea & Japan are joint. How would defense of Taiwan work as joint? (Depends on scenario.) U.S. forces coming home (including Navy as surge): erodes sustainment of allied connections.

What good are legacy forces?	Provide platforms on which to experiment with new systems. Keep the peace while transformation takes place. Demonstrated awesome capabilities (Desert Storm, OAF, OEF, OIF) provide deterrence & dissuasion for years to come; provides time and space for other experimentation and development.	Currently fighting insurgency in Iraq; stabilizing Afghanistan. Protecting Iraqi oil-loading platforms and patrolling Gulf. Possibly to patrol Malacca? Deterring North Korea. Once reset after Iraq, ready to invade Syria or Iran? Or to strike WMD facilities? SpecFor raids on terrorists? Training locals to fight terrorists.	Interact with allies in order to build solidarity and interoperability. Reassure South Korea and Japan. Deter China from attacking Taiwan (along with diplomacy).
What might we see for hulls?	As nodes in networks described above. Some as hubs (though restricted space, bandwidth). Trucks with room, power, storage for emerging capabilities. Lots of deck space for various new aerial vehicles, UUVs, etc. Sustained patrolling capabilities (LCS?). Missile defense evolution. Continuity in air strike capabilities on carriers, maybe aircraft on more vessels, within joint system. Develop niche/limited additional sea-basing capabilities (yields small force, too big for raids, too small for any Iraq-style invasion).	Patrolling in Med, Gulf/Red Sea, Indian Ocean, South China Sea. Continuing limited air support in Iraq. Continued improvement of air and TLAM strike capabilities in support of any new joint invasions. New roles for E-2Cs as an example of adaptability (after OIF)?	Use and improvement of legacy AEGIS systems in missile defense system against North Korea. Carriers continue to contribute to deterring North Korean attack of South and major deterrent to Chinese attack of Taiwan. Legacy surface combatants adequate for interactions with allies (most of whom improving own hulls, but declining in numbers).
Navy homeland defense potential (drawing away from world...)	Further development of contributions to national missile defense. Tracking air and sea traffic approaching U.S.	Air strikes on Iranian nuclear facilities and capabilities. Tracking down terrorists at sea before they reach U.S.	With allies, tracking down terrorists at sea in waters adjacent to The Core.

We may further consider, on a completely impressionistic and arbitrary basis (regard the numbers as bogeys) what the balance among these three paths may be now, in the mid-term, and in the future. The percentages in the following table are a reflection

perhaps of the level of intellectual effort in DOD; budget allocations would still be dominated by the maintenance of of legacy forces:

	Now	Mid-Term	Longer future
Force Building	10%	40%	40%
Ops in The Gap	70% (dominated by Iraq)	40% (resetting after Iraq; small actions on terror)	30% (higher if new invasion)
Ops in The Core	20%	30% (watch Taiwan)	30% (China surges?)

Criteria for examining fleet architectures, i.e., hulls (HME)

Admiral Cebrowski has set out some criteria against which innovations and transformations might be judged. With my crude interpretations, these are:

1. **Relevancy**, which I would judge be that hulls be appropriate to the tasks for which they are envisaged, fitting in the joint (and other agency) networks by which the U.S. maintains its security, and appropriate and adaptable to the unfolding world and its particular situations that are challenges to U.S. security.
2. **Preserving options**, which I interpret to mean not committing prematurely to an inflexible and too specialized system or systems; leaving room for growth; and keeping lots of experiments and prototyping going.
3. **Transaction rates**, which I think possibly refers to cycle times, but may also refer to how long it may take to change or adapt. The cycle times for platforms for every country in the world are now very long: F-22, the EuroFighter, and every home-developed Chinese aircraft were started back in the 1980s and still not delivered. People have been talking about AIP submarines for decades now, but the first real one has just been commissioned by the Germans. The cycle times for systems and weapons can be much shorter than for major platforms.
4. **Learning capability**, which I interpret as room for growth and adaptation once some capabilities paths are embarked on. Can the system be “reprogrammed”? Is it flexible enough to be used for things for which it was not designed originally? Is the basic form ample enough for it to be reequipped for different functions?
5. **Complexity at scale**. I’m not sure what this means. One suspicion that I have is that the Navy tends to build ships that are so packed with their specialties

that they have no growth or adaptive room—DDG-51 may be an example. They are only good for what they were originally designed for. Carriers are better—they are large trucks, and can carry anything, and their aircraft have been switched out over time. We found that LHDs couldn't be adapted for more aviation as originally built—they just carried Marines, and their fuel and ammo storage capacities were too small to switch over to more aircraft. LHD-8 may be given more flexibility that way. I think what I'm saying is too dense a complexity is bad. But I'm guessing. It may also mean that not all hulls need to be complete systems in themselves, i.e., have all the complexity. The complexity can be spread through the network, to which an individual hull can have access through its connections.

6. **Entity (not budget) cost as a cost strategy.** I'm also not sure what this means, but I am interpreting it to mean some kind of balance between the cost of the hull vs. the cost of the systems on it, and beyond that, the costs of all the nodes and connections of the network of which the hull is a part. This in turn would lead to careful inspection of whether the cost of the hull, especially if too specialized, results in opportunity costs that restrict the multiplication of nodes and connections. For fleet architectures, I'm assuming that the entities of the U.S. Navy are not just to be regarded as ships, i.e., hulls, but looked at as a total system, in which hulls play only one part (though, as said earlier, it wouldn't be a navy if it weren't strongly characterized as floating on water somehow—the hulls are certainly central nodes in the Navy system, if only ordinary nodes in the total joint system).
7. **Risk management.** The risks in transformation are that either one commits to future paths that simply don't pan out and leave you short, or you open so many paths, so many hedges, that the resulting system has not much character, or cannot be concentrated in its war-fighting capabilities as may be needed in an intense conflict.

These factors are examined for hulls in the following table, which is an attempt to find driving determinations, features, and characteristics.:

	I. Force-building	II. Force Operations in The Gap	III. Force operations in The Core
1. Relevancy	May be how to fit hulls into the growing and spreading American joint way of war system (so hulls would include MSC ships, too). There is major relevancy in transformation to “dissuasion,” interpreted as discouraging others from developing their own networked system.	After Iraq and Afghanistan, where will the next application of the American way of war? Iran? Syria? North Korea? Though given the need for resetting the ground forces, may not be for several years, in which case there is time for even more experimentation and adjustments for a better system. Otherwise, Navy is probably now over-qualified for patrols & raids.	Legacy forces maintain the great relevancy for a while with regard to The Core. But the challenge of transformation is to both deter and dissuade China so that it remains in The Core rather than seeking to become either a big military power or to embark on exotic new technologies of war (their scientific system starts out far behind).
2. Preserving options	Build maximum flexibility and growth room in new hulls—not to be too specialized, not for fighting past wars.	Hulls are to operate in the area (mostly confined waters); participate in surveillance of terrorists if cued. Connect with countries. May not see much action unless joint operation.	Preserve connections with allies (and rest of DOD), especially with surface hulls. Deter and defend Taiwan. Missile defense.
3. Transaction rates	Continuous experiments and prototyping means less force structure, better chances for breakouts if necessary. Keep making connections into net. Hulls need to be adaptable for new systems.	Nobody in The Gap is inside U.S. cycle. Without base in Afghanistan, al Qaeda terrorists are few and in basements. Innovate in IEDs and such. U.S. keeps up on margin. Watch Iran as in Earnest Will. Where they pop up is surprise.	China’s cycle so a is decades long, but could surprise, given their secrecy. Not yet innovative, except in writing. Europe takes forever to develop hulls, etc., but variety of outcomes. India taking forever.

4. Learning capability	Hulls don't learn by selves. Need prototypes with which to experiment. Feed back in spiral from experiments. Leave room to grow. Experiment with new materials and hull forms. Look for spacious top decks.	Wars have been best way to learn. Navy hulls for OIF were good trucks. See AEGIS netting/cueing function. Endless fruitless patrols may provide little learning, except necessary familiarity with environment and operating with others.	If no combat action, maybe little feedback into transformation. Interaction with allies and pick up their innovations. Share experiments with them. Watch emerging patterns of Chinese operations.
5. Complexity at scale	Look to expand network of hulls toward "scale-free" network. Avoid hulls so densely specialized and self-sufficient that inflexible. Get them to rely on connections and inputs from wider network. May leave room for growth, adaptation.	OIF "major combat phase" generated lessons in complexity and fog of war and adaptation (e.g., E-2C, EP-3). Another OIF would allow more refinement. F/A-18s as trucks in network. Complexity back at hubs and may be distant. Navy strikes dependent on system. See also TLAM targeting.	Leave to legacy forces. Chinese emerging net vs. more widespread U.S. net; watch their development of longer-reach surveillance and targeting. Chinese reaching out to sea may be greatest vulnerability of U.S. hulls down road: how to compensate?
6. Entity cost as strategy	Balance between costs of hulls and systems—keep hull costs down. Hulls not to swallow too much. Hulls still cost by ton? Or an alternative? Modular construction...	Challenge of seeking elusive terrorists is efficiency, where Navy must operate in overall search system, not alone. Doesn't have to be "everywhere in world."	How much of legacy forces needed in the area? (Highest envisaged deployments). Guam and Sea Swap to mitigate distances (Sea Swap mostly about Asia.)
7. Risk management	See discussion of risks below, and in the chart that follows, in different format.		

The risks discussed below and in the chart that follows are those listed in various DOD documents, and are cited in OFT's "Elements of Defense Transformation" of October 2004, page 5. It is interesting that the reference in this document is to "risk mitigation." Business takes risks, in order to develop new markets, but DOD only "mitigates" risks. Risks are hard for DOD to contemplate. What I may be saying above is that legacy forces operating in The Gap and in The Core may be keeping greater risks to the United States at bay, thus permitting DOD to devote a greater portion of its resources to taking the risks of preparing for the future—which is mostly hedging against unknown, but also involves the exuberance of innovation.

The question then becomes how hard it is to keep these two areas of the globe at bay—to solve global problems along the way—well enough to permit this to happen.

- In the case of the Gap, we won't know until the situation in Iraq is under control (and Afghanistan doesn't disintegrate again). In the meantime, (a) Iraq is draining resources, and (b) is leading to a greater emphasis on and a need for more ground forces—as I said earlier, almost all of the activity we worry about in The Gap occurs on land.
- The needs in The Core—reassurance of friends and allies, deterrence of attack by North Korea or China on Taiwan, and dissuasion of the rise of a “peer competitor” (i.e., a formidable militarized China) are more “virtual,” existing in a broader “space” of communication, intellectual activity, and activities internal to military establishments.

The legacy forces seem adequate for these purposes, except for the new problems for ground forces. It is thus probable that the U.S. Navy (and the U.S. Air Force—neither service is tied down by Iraq now, except for a low rate of air strikes and as resupply to U.S. forces is entailed)—may have some flexibility for greater experimentation with transformation at this time—always within the joint context, however, for the networks within which hulls are nodes are not exclusive to the Navy. Reflections on balancing risks follow, in the chart below:

Balancing risks				
	Force Management (People)	Operational Risk (sptg. current ops.)	Future Challenges (investing)	Institutional Risk (managing resources)
I. Force Building	With innovation, there may turn out to be less force structure, and with more automation, less manning of new hulls—but need for higher quality people and intense training.	Current ops are done by legacy forces--not with future forces. U.S. needs to be careful what it takes on: war uses up forces & people, diverts funds for future.	DOD doing lots of R&D, especially in Advanced Technology with great diversity and more than just weapons. Some platforms still taking big part of R&D funds (F-22, F-35).	Readiness of legacy forces still highest value (U.S. has to get off obsession with surprise attacks and rapid deployments); people costs go up; too many old claimants. Business savings has limits.
II. Operations in The Gap	Lot of people deployed--but not Navy and Air Force, which have “leisure” now. Iraq war attriting ground forces equipment and people. Is Navy doing MIO/LIO & PSI patrolling efficiently?	You get in a big operation like Iraq, and it drains procurement, robs R&D--especially while waiting for supplementals. Uses up staff, and to be replaced. Next need is more ground forces, not more ships.	Need feedback from operations, e.g., OIF lessons learned. Need especially to improve networks, e.g., in Blue Force Tracking, communications. Stabilization was new concern; now it's coping with insurgencies.	Combination of bad and prolonged Iraq experience, plus budget deficit and sinking dollar may give DOD economic trouble. Hopefully discourages a next invasion too soon. It may be time to step back--the global war on terror need not take large deployed resources.
III. Operations in The Core	U.S. forces to be deployed back to U.S.--means less contact with allies and elsewhere in Core. Navy Surge policy is part of this. People may be happier back in U.S.	U.S., in neglecting Core, could lose some touch with our natural allies and friends. Could lead to distorted (paranoid) view of world. Need to stay in touch, using legacy forces.	Actual operations by units less important than intellectual and technological dialogues with others who may be experimenting, and in commercial world. Watch China.	The costs may not be too demanding at this juncture. For Navy, Sea Swap and Guam could save resources. Moreover, the new surge strategy (FRP) implies risks can be taken re The Core.

Object vs. Method

Some basic factors

In order to stretch the mind with regard to fleet architectures, Art Cebrowski noted that we have to think out of the box of “integer outcomes,” that is, platforms, that is, just “ships.” Platforms are probably too constraining in thinking about evolving capabilities. The problem is to find a new trajectory. His concerns have been as follows:

Lives of ships. Up to now, the U.S. Navy has aspired to build ships that will last as long as possible. Carriers now last 50 years (though it takes a lot of maintenance to keep *Enterprise* going, and would have to keep *America*, *Constellation*, et al. going (*America* limped through its last deployment, even though the Russians were astounded by its apparent good shape); SSBNs have been extended to 42 years, selected Los Angeles class SSNs are being extended to 32 years (depending on careful monitoring of reactor life on individual boats). The capital investment seems to make that worthwhile—so long as they have usable capabilities or can be adapted for new uses (thus, CGs-47-51 are being retired at 18 years because they don’t have the versatile VLS and it would be too expensive to install it. The U.S. Coast Guard keeps its ships at least 50 years.⁸

At the other end of the scale, building short-lived hulls would mean that they would really have to be cheap, and this doesn’t seem possible. Replicating the relatively simple FFG-7, probably the most versatile patrol craft the Navy has, would probably cost at least \$700 million today. The tyranny of ships costing by the ton remains. Ships of less than 2000 tons do not have the capacity, power, sustainment, and sea-crossing abilities we still think we need.⁹

In between would be very adaptable, recyclable hulls, with sufficient volume for growth and modularity. VLS proved very useful that way, evolving from SM-1 all the way to TLAM and perhaps even to SM-4 for missile defense. But the SPY-1 radar and its support takes up an enormous amount of the volume and power on the CG-52 and DDG-51 classes.

8. Commercial ships tend to be run up the beaches in India and Pakistan for scrapping at about 30 years, but they have been operated nearly continuously across their lives. It is interesting that they still have enough power at the end to make the run at the beach.

9. I put one of the last class of 2000-tonners into commission back in 1957—the Dealey class DE1025. PCs don’t count. They have even less capability and room for more capability.

Materials. As Art Cebrowski says, steel is cheap, but heavy. His basic criteria for new vehicles, including hulls, would be that it shouldn't be spending its so much of its energy hauling itself around. But talking about just hulls, it would seem a lot of experimentation with other materials, of sufficient strength (and not too costly), seaworthiness, and durability would be necessary, in prototypes, before any commitment to some kind of serial production. I would note that it has been hard to wean automakers from steel, despite experiments with fiberglass and aluminum.

Numbers of platforms vs. capabilities. This is the greatly debated question these days. The numbers shrink, but the capabilities are ever more awesome. Some say, "numbers count." The dominant rationale who worry about ship numbers is that the fewer the hulls, the fewer places the Navy can be in. But this is not the Cold War, against a global enemy (however much, when deployed, Soviet ships wallowed in anchorages in places like Tartus and Socotra). Ah, but they say the Islamic radical terrorists are in 60 different countries right now! But they are not sea, and they fly between these places, if they are moving (most are becoming just local, running the local franchise as it were). If the U.S. Government were to say, "Go out right now and chase terrorists," it would not be clear where the Navy would go (allies have carried out sea and air patrols in the western portion of the Indian Ocean, where the Spanish intercepted the North Korean shipment of Scuds to Yemen). The fact is that any U.S. joint operations are concentrated in a spot these days—one of the major factors requiring their being netted and coordinated, if not the only factor. And these spots are tending to arise one at a time, usually at a time of our choice, including those operations meant to clear up long festering internal conflicts.

Other than the strategic question, the difficulty of reconciling platform numbers and capabilities is one of finding suitable metrics. We know them now for aircraft strike sorties. It is interesting that neither the Air Force or Navy has been strained in generating sorties, from Desert Storm all the way to OIF. The individual flights may be long, with repeated tankings, of course. But we clearly have enough—unless we were interested in conquering China like the Japanese tried in the 1930s. We have no idea what an efficient number of surface combatants might be for patrolling in search of terrorists, since we have no idea where they are. There's a new commitment to ourselves we've made to station Aegis destroyers off North Korea in anticipation of a big new North Korean missile deployment, presumably before they collapse. What all this may say is that there's wide room for experimentation, even at the cost of numbers.

We know that all hulls must be able to carry some war-fighting capabilities, or carry war-fighting capabilities out to remote places on the globe or to support them when there—usually thought of as the Gulf most prominently. We could build bigger packages for all kinds of flexibility as to what they might carry on broad decks or to launch as UAVs or UUVs. We can think of putting the same payload in smaller ships, like the smaller SPY-1 that are being installed in new 4,500-ton Spanish and

Norwegian destroyers. We know that whatever reach quickly to engage something is something that flies, usually a helicopter. A very specialized ship like DDX with two guns and otherwise loaded with rounds for the guns sounds too inflexible, though, as with lots of prototyping, a few might be OK. But highly specialized ships with large tonnage is going to be very costly, and therefore the opportunity cost of trying other things would be high as well—it would squeeze them out, as the F-22 program is doing in the Air Force.

Changing the rules

Hulls take ship-building. Ship-building has become a specialized industry, shrinking, clinging to the annual Navy's annual SCN budget, which now runs around \$11 billion a year, but in outyears would have to climb to something like \$19 billion to cover all the ship-building the Navy projects. Improved business practices and their savings have not seemed to make up the difference, even though they may have helped in increasing SCN from \$6 billion a few years ago to \$11 billion. Most people think that a further increase to \$19 billion unlikely to happen, in part because of the likely constraints (not necessarily reductions) imposed by the Federal budget deficit, the costs of continuing U.S. operations (i.e., Iraq) and the costs of maintaining the existing forces and their people.

Moreover, the costs of the ships in the pipeline continue to rise, in part because of original undercosting, in part because of the increasing share of overhead (e.g., for submarines) during limited production runs, in part because the ships get larger. (The FY05 program shows an additional \$2.6 billion for R&D clearly identified with ships.)

Altogether, it would appear that the system produces fewer ships for more money. There is some hope that LCS will reverse such trends, but it remains to be seen. At least the hull is to be one thing, and its payload modules something else—a clear distinction from the beginning.

How to break these trends? One way to do it is to review the customs, traditions, and habits that characterize the long-standing system for ship-building. Call them “the rules.” Then one can look at alternative rules. The alternative rules would not simply be the equal and opposite ones, but would be meant to open up opportunities and create new flexibilities. One cut at a changing set of rules follows:

Existing rules	An alternative set
1. Build ships for long lives.	1. Short lives? No—just build those anticipated for really long lives in a way that they are capacious and have enough power to be able to shift loads and roles. That is, they should not be too specialized <i>ab initio</i> .
2. Plan on replacement of previous types of ships (carriers, surface combatants, amphibious ships, attack submarines).	2. Rather than evolutionary steps, look for imaginative new hulls and capabilities.
3. Plan on long production runs of a given type, in order to reduce and stabilize per-unit costs.	3. Presently, take advantage of highly-capable legacy forces (whatever the numbers, but recognizing they have longer lives than previously), to experiment via prototypes. Build only a few of each type. Continuous development.
4. Crew sufficient for upkeep & damage control, thus high manning.	4. “Smart ships,” with more automation (along commercial lines), greater attention to maintainable surfaces and redundancy. For foreseeable future, any opposing force would hardly have the attacking capability the Soviets used to have.
5. Ocean-crossing and high sea-state resistance.	5. On a limited basis, consider “Sea Swap” ships in the design stage. Consider “mother ships” for smaller hulls.
6. Large sustainment capabilities, in fuel, food, spares, other supplies.	6. For at least some hulls, smaller crews and mother ships could help. For other hulls, make them even more capacious.
7. (New concern with stealth, just as there was an old concern for nuclear burst protection.)	7. Ships are still large objects. Better shapes may also help with maintainability (but may also challenge stability). But consider how many countries in future may be actually able to detect anything out to sea (China as the exception: is future design to be driven by conjectures on Chinese technological advances?) Subs have stealth, but there is no need to multiply them over other hulls simply for that purpose.

8. (Now talking about speed for trans-oceanic crossings.)	8. Don't worry about warning time. Inevitability (and weight) of response is more important than speed of response. In hulls, look for only "cheetah speed:" short bursts in the area for hunting or escape, for some hulls. Is the greatest challenge the druggies fast boats?
9. Multi-capabilities of surface combatants—but turns out to have limits. (And could be costly, like multi-phase radar for DD-21.)	9. VLS has been good in its adaptability. Platforms should not be too tightly designed for their functions. Seek modularity. In the network concept, not all capabilities need to be resident in all hulls. Reachback exists.
10. Ships have both defensive and offensive capabilities, or talk of putting defensive systems on amphibious ships.	10. Distributed defense within the network.
11. "Numbers count:" got to be everywhere in the world.	11. Areas of concern are few, and operations ordered by the Administration are likely to be concentrated in an area. Tailor to joint operations, not to small operations dispersed all over the world.
12. Still have to maintain "the great commons of the oceans" and to protect world commercial ocean traffic.	12. Global trade quite unthreatened, except in a few tight spots (Gulf, Hormuz, Malacca). Still no prospects for escorting convoys.
13. Need to keep minimum of 6-8 shipyards. Naval shipyards are practically the only ship-building capability left in the United States. And Navy can't buy hulls overseas ("Buy America").	13. The U.S. manufacturing sector, while down to 14% of GDP, or over \$1.5 trillion is nonetheless about the same size of the whole Chinese economy (at exchange rates). SCN accounts for only \$11 billion. Industrial bases improve productivity and innovation through "creative destruction:" green-field starts do that. Hulls, though, seem to need drydocks. But submarines don't. Are there ways to diversify production? Is LCS the way?
14. Ships take up to 7 years to build.	14. The only consolation is that every other country in the world takes the same time. But even aircraft have a least 3 years lead-time. Need to examine the whole production pipeline.

15. Is commercial ship-building faster?	15. Not known. Not much innovation—except maybe in LNG tankers and cruise ships. Mostly they’re just big hulls without a lot of specialized equipment. Is the solution build hulls with capacity and then configure them later? Does the configuration have to be complete from the beginning
16. Steel is cheap, but heavy.	16. Need for experimentation with other materials, especially for smaller ships. The problem would be their costs, structural integrity, and durabilities -- especially since there’s no experience except in small craft.

What would the changed rules imply for new hulls?

The transformation pillars are (1) strengthening joint operations, (2) exploiting U.S. intelligence advantages (though they have not seemed very good so far against insurgents or to track down terrorist cells), (3) providing for concept development and experimentation, and (4) moving from the industrial age to the information age.

It is not easy to apply all of these pillars to the process of designing, prototyping, and serial building of new hulls.

1. **Strengthening joint operations** seems more clear-cut than the others: whatever hulls are built, they should fit into the joint network—and indeed would be dependent on it rather than incorporating those elements in self-sufficient ways. I have in mind all the capabilities in space, especially for GPS and communications. These also permit rapid reachback, so that TLAM targeting, for instance can be performed anywhere in the world. UAV controls can also be exercised from distant places, even from Tampa, even if the vehicles themselves were launched from hulls. It is not even necessary to put the experts who read their downlinks on the hulls—though there is much talk now of downlinking to tactical units, which can take immediate action (within the rules of engagement) on the basis of the information. Personnel on hulls could take such action, even deep onto land, but the question would remain whether it is really essential to put such capabilities at sea. Tanking is not going to be stationed at sea, not even for “the foreseeable future.” It is not precluded that tankers could be stationed at sea, but restrictions on size and power from decks mean that they will never have the capacity (F/A-18E/F buddy tanking is only a short-range solution).
2. **Exploiting U.S. intelligence advantages** is also more a matter of space connections than equipment that might be installed on hulls. Right now, there

seems to be a big split between space intercepts (imaging and SIGINT) and HUMINT on the ground, with the latter now talked about as of renewed importance. Personnel out on hulls are not in a very good position to pick up HUMINT. They can listen from offshore, but interpretation would have to be done elsewhere.

3. The question of **providing concept development and experimentation** lies in whether there's both budget room and intellectual room (priority for senior leadership) to do so. The answer in the preceding pages is that there is, given the substantial legacy U.S. Navy forces that are better than any other in the world and have proved their capabilities in actual war-fighting and which can cover both the critical areas of The Gap and The Core for years to come. However, if there were too much anxiety in the overall system (Navy, Administration, Congress, special interest lobbies, ship-builders, and other suppliers) about numbers of hulls, which could only be relieved by continuing production of existing hulls, the squeeze would be on concept development. If the need was felt too strongly to maximize deployments of existing hulls, it would put the squeeze on experimentation. The present surge concept (FRP) may facilitate experimentation. Even under current operational squeezes, the Navy (including Marine Corps) is investing over \$20 billion in R&D, of which at least \$2.6 billion is for ship systems development.
4. **Moving from the industrial age to the information age**, whatever that means, is well-advanced in terms of the demonstrated networks that have been fielded. More and more platforms, including hulls, even submarines, are connected, with more to come. The only thing that can't really be done off the hulls without it no longer being a navy is to haul war-fighting capabilities, that is the means of killing and destroying, to the scene. Hulls offer a nice combination of the two as nodes in the war-fighting system.

Characteristics of hulls and the process of designing, experimenting with, and producing hulls that may emerge from the steps above

Hulls are nodes in the U.S. joint war-fighting system. They carry war-fighting capabilities to the scene of battle and are connected so that those capabilities can be applied effectively and efficiently. That means hulls do not need to have self-sufficient capabilities to do battles. or at least strategically significant battles, all by themselves or even together as a group of hulls—nor could they as experience has shown. Much of the information age stuff on which they rely is elsewhere.

Hulls are trucks, with capacities to carry war-fighting systems and war-fighting people to battle. If they were single-system configured, and packed too tightly, e.g., for anti-air warfare, they would not have the flexibility for the evolving

circumstances over the coming years—of would be grossly over-qualified (e.g., AEGIS destroyers blockading rusty coastal tankers from reaching Haiti). This might suggest larger hulls would be better than smaller.

The unfolding era in The Gap would seem to imply lots of patrolling, including in shallow waters, which would in turn mean relatively nimble, shallower-draft hulls, without too much heavy war-fighting capability aboard, yet with the connections that allow it to receive cues from the network.¹⁰ LCS in concept seems good for this, and in concept is a truck to take various modules to the scene (though, as has been pointed out, and following a Danish experiment with modules, a single hull is likely to carry its original module throughout its lifetime). There is a possibility that it might be useful to have a mother ship to provide the longer sustaining capabilities for such patrol ships.

There is a question of how much self-defense they need to carry. We have said that naval battles would not be likely to characterize operations in The Gap. There could be small boat attacks or cruise missiles fired from the shore. If the challenges in The Core are a future scrap with China over Taiwan, the Navy would want to do either long stand-off or close-in self-defense. It would look rather classic in this regard—but then we’ve said that legacy forces may already have these capabilities, which need only to be continually refined—not a bad thing if the hulls are to be retained for their designed lives and they can be otherwise useful.

But the major point, considering the challenges and their scale in The Gap and The Core, is that the situations of concern would tend to be concentrated rather than dispersed, and that operations there would be joint. Thus, even a shrinking legacy force would be adequate to keep the world at bay for years to come. What I am saying is that there is some room to experiment with different kinds of hull prototypes, both to see what new materials and configurations might be possible, as well as cost controls, and to open several paths of adaptation while changes in the global system evolve—and new connection possibilities in the network emerge as well.

All of these considerations are based on The Gap and The Core being “over there,” across the two oceans. If there were another major and catastrophic terror attack in the United States, there could finally be a determination by the Administration in office to make a major swing to homeland defense. The need for new kinds of hulls could take much different directions.¹¹

10. See CDR Michael Poirier, USN, “An Attack Submarine in the Global War on Terror,” *The Submarine Review* (October, 2004), pp. 38-45.

11. My senior Radarman on DE-1025 came to use from a DER wallowing in the North Atlantic as part of the DEWLINE extension.

What to do with legacy forces?

The implication through this paper is that U.S. Navy legacy forces are highly capable and have performed well in the major operations (Desert Storm, OAF, OEF, and OIF). They improved vastly in their strike capabilities and connections within the joint system from Desert Storm to OIF. They continue to be tweaked. They may well be appropriate for the next decade or two, depending on how China evolves—though China has a long way to come and is unlikely to have actual war-fighting experience for years to come, unless they mount a come-as-you-are attack on Taiwan. They may continue to shrink somewhat, and even considerably if new types are delayed in entering the force. Every other navy in the world is shrinking as well.

- **Carriers.** The Navy has 10, plus CVN-77 under construction. It is likely that CVN-21 will be slipped to a much later date than originally envisaged. The USS Enterprise probably should be retired forthwith—it is non-standard. The 6-8 surge capability is arbitrary. Sortie rates for Desert Storm, OAF, and OIF were not straining (even though the Navy has demonstrated greater sortie surge capabilities). A carrier was not even needed for OAF, in CNO's view. Carriers serve in both The Gap and The Core and are both dissuader (hard for China to copy) and deterrent (especially with regard to Taiwan and probably with regard to North Korea, which hasn't attacked for 54 years now.)
- **Cruisers.** The Navy will have 22 for a long while, especially if their upgrading is conducted as planned. They may well take on a large ballistic missile defense function—as part of national missile defense (however it may be described as “global”). Of course, missile threats to the U.S., beyond those of Russia and China, have not appeared as yet—except for the one North Korean test missile. The cruisers may be most useful for force operations in The Core.
- **DDG-51s.** The Navy will have 62 that are fairly new. The complaint is they are full-up, with no room to grow (helicopters were wedged in the later versions). But they are already being assigned for missile launch warning off North Korea, just as they were able to track Chinese missile tests into waters near Taiwan in 1996. Moreover, they have demonstrated roles in the network in cueing Patriot from offshore (as they did off Israel and the Hue City did in OIF). They can fire a lot of TLAMs—the workhorses of this function.
- **FFG-7s** are the quintessential Gap force, from the Caribbean to the Gulf. They may even be more useful without their air defense missile capability. If they retire before being replaced, they will be missed.
- **SSNs.** There may be 54-55 right now, but the force will shrink because the system simply cannot wedge construction of 2 a year into the budget. Their estimated lives have been stretched somewhat, depending on the individual submarine and its upkeep and reactor life. One estimate is that 37 would be

enough. All remaining would have vertical launch tubes, though 12 per doesn't add much, as compared to the CGs and DDG-51s. They are useful for surveillance, but most of us are not clear to know how useful. In this sense, though, they operate within the network (see footnote 10). The only real opposing submarine force would be the Chinese, so its war-fighting capability applies mostly to The Core.

- **SSGNs.** Four Trident boats are to be reconfigured to SSGN configuration. It is nice that these splendid craft can be adapted so they don't have to be retired before their 42-year lives are up, and it is a done deal, but they don't add much, whether to TLAM tubes or with Seals.
- **Amphibious ships.** I am sorry, but the ambitious plans for sea-basing do not fit for operations in either The Gap or The Core. Why? Because at best they deliver only 15,000 troops (General Hagee says 15,000; Bob Work says 17,000). This is far too small for another OIF (e.g., an invasion of Iran) and far too large for a raid to capture terrorists. It is not joint enough. "To do it right," per the DSB Summer Study, would entail the development of costly and risky intermediate delivery systems—still only for the force of 15,000. The United States has been remarkably successful, from Desert Storm to OIF, at getting access for administrative landings. Turkey refusing passage for OIF should not be taken as representative of the way the world is going. Sea-basing is a niche capability at best, nice to have, a good example of capabilities-based planning, but its application in either The Gap or The Core is hard to envisage. The course of U.S. foreign policy might be such as to leave the joint system with only this recourse, but that is not inevitable at this time. In the meantime, it may be enough if it turns out that the Navy has 8 LHDs (assuming no LHA(R)) and 8 LPD-17s, plus some simple replacement of MPS ships (possibly by converting some LSMRs—though that is a trade-off against the larger total ground force that has proved absolutely necessary). At most, MPF(F) is only worth an experiment in prototype.

Some reflections on strategy vs. forces

Strategic discussions these days in DOD try to sort out strategic functions in the world, to include dissuasion, deterrence, defeat in the even of conflict, and reassurance (or keeping countries on our side). I make a distinction between dissuasion and deterrence:

- **Dissuasion**, from all that I've read so far, is the discouragement of other countries from entering into future and technological competition in the build-up, configuration, and altogether assembly of some threatening integrated force. At this point in time (late 2004), the U.S. is spending around half of the collective defense spending in the world, and its acquisition and R&D budgets

are each larger than any other country's defense budget. For some countries, especially perhaps the European countries, this may let them off the hook (besides, there's no threat to Europe except the terrorists). Some countries may simply pursue niche capabilities or may simply provide for their minimal defense. Admiral Bill Owens used to say that there was no sense in their making the investments to duplicate U.S. capabilities, especially at the high end, because the U.S. would already cover them under its umbrella, i.e., we could share it, and let them specialize below that end. China right now looks like the country the U.S. might wish to dissuade from a large, sophisticated defense effort. They may do so anyway to increase the threat to Taiwan, or for the prestige of it, or because they are opening up to new technologies and want to try them. They have a long way to go.

- **Deterrence**, as it has traditionally been postulated (since around 1948 and the initial thinking about nuclear weapons), is aimed at discouraging other countries from specific military actions, as opposed to how they might configure their forces. There is no deterrence unless it is deterrence of some action.
- **Defeat** is self-explanatory—once into a conflict. Of course, it reeks of classic battles, and the U.S. has defeated Iraqi organized forces and overturned a regime, but that hasn't solved the problem in Iraq. Now the U.S. has to defeat an insurgency—which everyone says cannot be done by the military alone, especially a foreign military, and especially one that doesn't know the language and has no feel for the culture. But at least “defeat” can mean operating with the maximum military efficiency to out-maneuver or attrite an enemy force that one has engaged. This is where fighting, killing, and destroying come in.
- **Reassurance** is to those countries that the U.S. is defending or protecting, including in a collective effort. Providing reassurance is a way to keep them on our side and also saves them the trouble of mounting their own self-contained defense.

Playing these against the three strategic areas considered in this paper—that is, force-building, force operations in The Gap, and force operations in The Core, and with particular attention to hulls, we can construct the following chart:

	I. Force Building	II. Force Operations in The Gap	III. Force Operations in The Core
Dissuade	Stay ahead technologically and with unique capabilities that are hard for anyone else to duplicate. Hulls may be less important in this regard than the systems to mount on them and the connections they make. That is, put more resources into the systems and network than into the hulls. In this regard, stealth and speed may be not so important.	Dissuading in this case is not particularly a military matter, but political--discouraging people from joining the terrorists. There is a lot of diplomacy to dry up any sources of WMD and the industrial capability necessary to produce them. Hulls wouldn't seem to play much in this case.	The power, cost, and sophistication of U.S. carriers is very dissuasive to China (or any other country) doing the same (to include the aircraft). But counters to capabilities that can't be matched could grow: defenses of hulls and greater reach in surveillance would seem to be where the U.S. needs to stay ahead.
Deter	You don't deter specific actions with what you don't yet have in the force. Staying ahead is dissuasion. Leaving specific deterrence to legacy forces gives the U.S. the latitude to experiment with hulls , etc.	Deterrence of terrorists right now lies in controlling movements and drying up financing--airport controls, and container inspections. Do U.S. ships at sea on patrols deter terrorists from going to sea? Deter Iran...	Deterrence now operating strongly on North Korea and China (with regard to Taiwan, possibly Spratlys) Nuclear complications, but U.S. way ahead, including SSBNs , ICBMs. Legacy forces sustain.
Defeat	U.S. adds capabilities for greater military effectiveness. Is it necessary to invent straw men to defeat (imagining mirror image capabilities)? Hulls need to accommodate newer war-fighting systems, including network connections, in a joint force, for greatest U.S. strength.	U.S. defeated Taliban in Afghanistan, hasn't yet defeated insurgents in Iraq. U.S. air and ground capabilities can take down a regime, but stabilization now a problem. Hulls contribute to the initial battle, then monitor sea access. May also be bases for raids to catch identified terrorists or take out WMD facilities.	Not clear what wars may yet break out in The Core, since notion of Core is to displace war with trade, economic prosperity. A great battle with China over Taiwan would be quite an event. Legacy hulls as improved through force-building across time carry the burden, especially as it is not clear U.S. would want to strike or invade Chinese mainland.

Reassure	U.S. continuing to lead the world in technological innovation and exploitation, while maintaining good relations in alliances and otherwise, with some sharing (especially for interoperability) should be reassuring for world peace. Continuing to have deployable, fightable hulls “over there” contributes. U.S. retreat to homeland defense would be another matter.	U.S. is the only country to maintain general security in the Middle East, especially in the Gulf, having long ago replaced the UK. Its hulls (e.g., 3 DDs in MidEastFor) have long served to stabilize. Saudis and other Gulf states have benefited from this offshore protection. It is interesting that LCS design is almost all about Gulf defenses. U.S. is also enlisting allies in MIO/LIO and PSI--takes cooperation and interoperability, cueing and contributing to global surveillance resources.	U.S. hulls good way to continue to interoperate with allies and friends of The Core. This also opens up possibilities for feedback to force-building.
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Conclusion

I’m not quite sure what all this means for the future of hulls for the U.S. Navy. I know that I have detached hulls from the war-fighting and networking systems that would be on board them. What I am saying is that the two sets should not be so intimately tied together, in such a completely symbiotic relation, that the whole system becomes too specialized and not adaptable as circumstances and Administrations’ policy with regard to the use of the U.S. Navy may warrant. This is especially true since it is unlikely that the industrial system, technology, and the science of materials would be able to build anything that wouldn’t last for 30 years, in terms of its durability and seaworthiness. Nothing indicates that we are close to throw-away systems—unlike maybe PT boats and Liberty ships were during World War II. If a hull is going to be around for 30 years, then, it had better be adaptable as better systems and different circumstances come around.

At the same time, while some describe the current and future situation as more dire and parlous and threatening than the Cold War (which is not only a joke, it’s a howler), the situations now and as they are likely to emerge are more definite and localized. Even the global terrorists, dispersed, elusive, mutating, and growing as they may be, are dispersed and in small groups— with the exception right now of the insurgency in Iraq. They have no access to anything industrial, except possibly in some small shops they may own. The major point about this is that the U.S. owns legacy forces of tremendous capability, with no equal in sight—that’s why we Americans conjecture about clever underhanded methods by the rare enemies we may encounter, which wouldn’t otherwise be a sensible choice for them. It is the future of China with which everyone is now concerned, including the Chinese government: it has both potential because of its size and internal

market, which is complicated by its size and the difficulties of maintaining internal control.

It is not yet clear how much innovation in hulls would contribute to managing the world as it is evolving, but that means there is room to experiment with different hull forms, size, and capabilities for varying kinds of payload. And this experimentation can probably be done even at the risk of further shrinkage of the legacy fleet—though this shrinkage may be mostly in Los Angeles-class SSNs, FFG-7s, and the older LSDs and LPHs, while the carriers, DDG-51s, and LHDs are relatively young. Given the retention of much of the legacy fleet, unless there were a huge budget squeeze if the United States runs into the financial difficulties some are worried about, these experiments probably should tend to hulls with more capacious qualities and large decks, since so many of their war-fighting vehicles may be of the flying sort. At the same time, the global terrorists, pirates, and the possible need to shift massively to homeland defense imply some kind of nimble patrol ships, which the LCS experiments might produce, providing they do not turn out to be too complicated and costly. The greatest dilemma in this coming period of experimentation may be that of sustaining the industrial base, or that it should be simply sustained as a high priority simply because of the political clout the industry may have. Apart possibly from submarines and their nuclear reactors (the only ones being built in the U.S. right now), the opportunity may also exist for exploring a more diversified industrial base for hulls.

